Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims

1. (Previously Presented) A computer implemented method of operating a boiler system having a plurality of stages which may be active or inactive at a given time, the stages having outputs, the method comprising:

performing a staging sequence, at a first interval, to determine how many of the plurality of stages should be active;

modulating a first stage, at a second interval shorter than the first interval, to operate at less than 100% of its output; and

modulating a second stage, at a third interval shorter than the first interval, to operate at less than 100% of its output;

wherein the first and second stages are modulated while both stages are active.

2. (Previously Presented) The computer implemented method of claim 1 wherein each of the plurality of stages is an individual boiler, and wherein the step of performing a staging sequence determines how many individual boilers should be active.

3. (Previously Presented) The computer implemented method of claim 1 further comprising the step of performing a selecting sequence to determine which of the stages should be active.

4. (Previously Presented) The computer implemented method of claim 3 wherein the selecting sequence includes a first on/first off method.

5. (Previously Presented) The computer implemented method of claim 3 wherein the selecting sequence is adapted to equalize the time in which the stages are active.

6. (Original) A controller for a boiler system, the controller configured to perform the steps of claim 5.

7. (Original) A controller for a boiler system, the controller configured to perform the steps of claim 1.

8. (Previously Presented) A computer implemented method of providing heat capacity in response to a heat load using a boiler system having a plurality of stages that may be active or inactive at a given time, the method comprising:

performing a staging sequence, at a first interval, to determine which of the plurality of stages should be active or inactive, resulting in a number of determined active stages;

activating the determined active stages, if any; and

when the determined active stages includes two or more of the plurality of stages, modulating the active stages, at a second interval shorter than the first interval, while they are active.

9. (Previously Presented) The computer implemented method of claim 8 wherein the step of modulating the active stages includes modulating each active stage to substantially the same level of modulation.

10. (Previously Presented) The computer implemented method of claim 8 wherein the step of modulating the active stages includes sending a modulation signal to each of the active stages from a single controller.

11. (Original) A controller for a multi-boiler system, the controller configured to perform the steps of claim 8.

12. (Previously Presented) A computer implemented method of operating a boiler system having a plurality of stages which may be active or inactive at a given time, the method comprising the steps of:

performing, at a first interval, a staging sequence to determine how many of the stages should be active; and

performing, at a second interval shorter than the first interval, a modulating sequence to modulate the active stages.

13. (Previously Presented) The computer implemented method of claim 12 wherein the staging sequence includes a sub-method for making an inactive stage active and a sub-method for making an active stage inactive, wherein:

the sub-method for making an inactive stage active is disabled for a first time period after an inactive stage is made active;

the sub-method for making an active stage inactive is disabled for a second time period after an active stage is made inactive; and

the second time period is shorter than the first time period.

14. (Previously Presented) A controller for a boiler system, the controller configured to perform the sub-methods of claim 13.

15. (Previously Presented) The computer implemented method of claim 12 wherein the boiler system includes a number of separate boilers, wherein each boiler represents a stage.

16. (Original) A controller for a boiler system, the controller configured to perform the steps of claim 12.

17. (Previously Presented) A computer implemented method of controlling a multi-stage boiler system having a number of stages that can be either active or inactive, the method comprising the steps of:

determining whether to make an inactive stage active; and

determining whether to make an active stage inactive; wherein:

a first delay is provided after making an inactive stage active,

a second delay is provided after making an active stage inactive, and

the first delay is longer than the second delay.

18. (Previously Presented) A computer implemented method of staging and modulating a boiler system in response to a load comprising the steps of:

staging and modulating the system using a first control method that is adapted for achieving increased efficiency under a first set of conditions; and

staging and modulating the system using a second control method that is adapted to allow cycling of the stages under a second set of conditions.

19. (Previously Presented) The computer implemented method of claim 18 wherein at least one of the second set of conditions is that the load exceeds a threshold.

20. (Previously Presented) The computer implemented method of claim 18 wherein at least one of the second set of conditions is that the system has operated by staging and modulating using the first control method for a predetermined time period.

21. (Previously Presented) The computer implemented method of claim 18 wherein the first set of conditions includes non-occurrence of all of the second set of conditions.

22. (Previously Presented) The computer implemented method of claim 18 wherein at least one of the first control method and the second control method includes:

performing, at a first interval, a staging sequence to determine how many of the stages should be active; and

performing, at a second interval shorter than the first interval, a modulating sequence to modulate the active stages.

23. (Previously Presented) The computer implemented method of claim 18 wherein at least one of the first control method and the second control method includes a sub-method for making an active stage inactive and a sub-method for making an inactive stage inactive, wherein:

the sub-method for making an inactive stage active is disabled for a first time period after an inactive stage is made active;

the sub-method for making an active stage inactive is disabled for a second time period after an active stage is made inactive; and

the second time period is shorter than the first time period.

24. (Previously Presented) A boiler system comprising:

a controller configured to perform the method of claim 18; and

a switch;

wherein the first set of conditions includes having the switch in a first configuration, and the second set of conditions includes having the switch in a second configuration, the switch adapted to allow a user to manually select one of the first configuration or the second configuration.

25. (Previously Presented) A computer implemented method of performing a staging sequence for a multi-stage boiler system in which at least one stage can be either active or inactive, the method comprising the steps of:

observing an error measured as a difference between a temperature and a setpoint;

observing a rate of change of the error; and

combining the error and the rate of change of error to determine whether:

an inactive stage should become active;

an active stage should become inactive; or

no change in the number of active stages is necessary.

26. (Original) A controller for a boiler system, the controller configured to perform the method of claim 25.

27. (Previously Presented) A computer implemented method as in claim 1 wherein the steps of modulating a first stage to operate at less than 100% of its output and modulating a second stage to operate at less than 100% of its output are such that both the first and second stages operate at less than 100% of their respective outputs at the same time.